Data Documentation Template

This data documentation template is designed to assist BC analysts in recording the data and methodologies utilized in their BCA. BC analysts should keep in mind that a well-documented BCA means a knowledgeable subject matter expert (another BC analyst) should be able to re-create the BCA from the supporting documentation provided (with a Mitigation application submitted for funding) without any additional explanation. BC analysts should provide an electronic or paper copy of the full BCA to compliment any template or summary submitted to FEMA for review.

A **Data Source and Documentation Summary Chart** is provided at the end of the template chart for completion.

Earthquake Data Analysis Methodology: Structural Retrofits of Buildings

This data documentation guidance and the Earthquake Full Data Module are intended for BCA of structural seismic mitigation projects for buildings. For non-structural seismic mitigation projects do not use the Full Data Module. Rather, use the Non-Structural Module and see the non-structural data documentation template.

Data Type	Value	Description	DOCUMENTATION	Source
Discount Rate	The OMB-mandated discount rate of 7% must be used for all BCAs.	The discount rate determines the time-value of money In a FEMA benefit-cost analysis, a discount rate is used to calculate a value today (the Net Present Value) of future benefits so that they can be compared to the costs of a mitigation project.	■ Electronic or paper copy of the BCA. ■ **The OMB-mandated discount rate of 7% must be used for all BCAs.**	■ **The OMB-mandated discount rate of 7% must be used for all BCAs.**
Mitigation Project Useful Lifetime	Years	Estimated amount of time that mitigation action will be effective. Includes any maintenance activities that will be done to prolong effectiveness.	■ Reference FEMA standard value if utilized. ■ If FEMA standard value is not utilized then include a justification of the value entered. ■ May also attach a letter, e-mail, etc. from credible agency documenting this estimate (if resource other than FEMA standard value).	■ FEMA guidance. ■ Government representative or private professional with expertise relevant to the proposed project.
Mitigation Project Cost	Total dollar value	Estimated total cost of the proposed mitigation action **(not just the Federal share)** and any maintenance activities that will be done to prolong effectiveness.	■ Narrative summary in the BCA module should state that this value comes from a potential or submitted project application. ■ Must document source and reasoning in estimate of maintenance activity cost.	■ Should support the value submitted with the project application. ■ Government representative or private professional with expertise relevant to the proposed project. ■ For maintenance values, consult Government representative or private professional with expertise relevant to the proposed project.

Data Type	Value	Description	DOCUMENTATION	Source
Seismic hazard data	Spectral acceleration values for 50-year and 250-year earthquakes	Measures of the probability and severity of earthquakes at the site.	■ Provide a copy or reference source utilized.	■ Table in Technical Manual for Earthquake Module, Chapter 7 **Please Note – calculated values in the Full Data module are generally not accurate. FEMA is working to remedy this issue.**
Expected annual number of earthquakes	Frequency	Annual probabilities of various levels of ground shaking, expressed in PGA (Peak Ground Acceleration, relative to "g" the acceleration of gravity)	■ If Full Data calculated values are utilized then verify their applicability. ■ Provide a detailed description of how user-determined values were developed. Reference the instructions in the Earthquake Data Derivation Chapter to for guidance.	■ Earthquake Data Derivation Chapter in the Mitigation BCA Toolkit CD. ■ Use software modules for Seismic Hazard Calculations ■ Follow calculation procedures in Earthquake Data Derivation Chapter **Please Note – calculated values in the Full Data module are generally not accurate. FEMA is working to remedy this issue.**
Soil Type	Soil classification used in building codes Important factor in seismic hazard level at project site	There are two common classification systems, S0, S1, S2, S3 and S4 in the old Uniform Building Code and a newer system with A, B, C, D, E F for soils varying from rock to very soft soils.	■ Provide copies or reference source soil type map utilized (local engineering studies, county or state).	■ Geotechnical engineers, State geological surveys.
Building type	Selection of one of the building construction types within the module	Number of stories above grade. Major determinant of anticipated earthquake damage.	■ Reference source utilized to determine classification of building type (Ex. engineer, building official).	■ Engineer or local building official or other person knowledgeable about structural building types ■ See definitions of building types in Earthquake Technical Manual Chapter 6
Building replacement value	Expressed as dollars per square foot	The cost for labor and materials to build a similar building at the same location. A key determinant of the amount of damage.	■ Letter from local building department or residential builder. ■ Or, photocopied pages from standard residential cost reference manual for the specific type of building.	■ Local building department, builder, contractor, or architect. ■ Standard references such as Marshall & Swift Residential Cost Handbook, and Means Square Foot Cost Guide.

Data Type	Value	Description	DOCUMENTATION	Source
Building seismic damage function	Percent damage of building replacement value for each level of ground shaking.	Estimate of building damages for each level of ground Use software modules for Seismic Hazard Calculations Follow calculation procedures in Earthquake Data Derivation Chapter Estimate	■ If Full Data calculated values are utilized (typical values in FEMA software are outdated) then verify their applicability. ■ Use Fragility Curve Calculator software to generate more accurate seismic damage functions ■ For structural retrofit of bridges or utility systems, damage functions must be generated by structural engineer	■ Earthquake Data Derivation Chapter in the Mitigation BCA Toolkit CD. ■ Use Fragility Curve Calculator for seismic damage function estimates ■ Follow calculation procedures in Earthquake Data Derivation Chapter ■ Or building (facility) specific seismic damage function generated by a structural engineer **Please Note – calculated values in the Full Data module are generally not accurate. FEMA is working to remedy this issue.**
Building damage that would result in demolition	Percentage of building replacement value	FEMA standard value is 50%. Low cost or poorly maintained buildings may have lower thresholds; buildings of historical or other importance may have higher thresholds.	■ No documentation required if standard value used. ■ Provide documentation and the basis of the estimate for values other than 50%.	■ Values other than 50% should include consultation with real estate appraiser, economist, local building inspector, contractor, builder or construction company, architect or building engineer, planners, etc.
Dollar value of a Casualty	Dollars (present year)	Estimated value of the loss of one person.	■ If typical values in FEMA software are used then provide print out of software. ■ If user-determined values are used provide full documentation of reasons for differences from FEMA typical values.	■ FEMA “What is a Benefit” guidance
Dollar value for minor / major injuries	Dollars (present year)	Average of the estimated values for the treatment of major and minor injuries per person.	■ If typical values in FEMA software are used then provide print out of software. ■ If user-determined values are used provide full documentation of reasons for differences from FEMA typical values.	■ FEMA “What is a Benefit” guidance
Contents value	Expressed as dollars	The cost to replace the contents of a building. Contents damage includes items like furniture, office equipment, personal belongings, and non-permanent room dividers. Contents do not include items that are permanent parts of the building such as electrical and plumbing systems. FEMA standard for residential buildings is 30% of the replacement value of the building.	■ 30% value for residential buildings: no documentation required. ■ For other values for residential buildings and for non-residential buildings, provide detailed descriptions of contents, value and the means by which value was assessed.	■ No source required if a residential building and FEMA standard is used. ■ Otherwise, review insurance records, signed appraisals, purchase receipts, estimates based on current market prices for similar contents.

Data Type	Value	Description	DOCUMENTATION	Source
Occupancy	Number of occupants	Average (not peak) occupancy on 24/7/365 basis	■ Provide description of estimates methodology utilized (to establish number of employees and visitors at different times of days and days of week).	■ Building owner or manager
Functional Downtime	Days, increases with wind damage (building percent damage)	The time period for which public or commercial services are lost from a building.	■ For ordinary buildings, typical values in FEMA software. ■ For critical buildings, use "What is a Benefit?" guidance.	■ No local source required if FEMA typical values are used. ■ Developing non-standard values may involve working with organization or agency providing service.
Value of loss of service	Dollar value of loss of public services	For public services, daily value of service is estimated by the daily cost of providing service.	■ Provide copy or reference the annual operating budget for public facility. ■ For critical facilities, see What is a Benefit? Guidance.	■ Agency providing service (annual operating budget for public facility).
Continuity premium	Multiplier on ordinary value of service	Applies only to services critical to immediate disaster response and recovery (police, fire, and emergency responders).	■ No documentation required if FEMA standard values are used. ■ Exception to standard values requires detailed explanation of source used and method applied.	■ See "What is a Benefit?" guidance for standard values. ■ Developing non-standard values may involve working with organization or agency providing service.
Displacement costs	Expressed as dollars per square foot per month, and one time and monthly costs.	The costs borne by occupants during the time when a building is damaged and they are unable to occupy it. Costs may include rent for alternative living spaces, rent for storage space, additional commuting time, additional day care, unpaid time off work, rental trucks, etc. All these may be estimated when supported by credible documentation and sources.	■ Alternative living space documented by copies of rental costs from realtors, leasing agents or newspapers, among others. ■ Rental for storage spaces may be supported by copies of advertising, records of contacts with rental companies. ■ Extra commuting costs and day care may be estimated as long as the estimation methodology is explained.	■ Photocopies of ads for rental spaces in the community, records of phone contacts with rental agencies, receipts from similar rentals. ■ For residential properties, typical displacement costs are $0.50 to $1.00 per square foot per month. Typical other monthly costs and one-time costs are $500 each. ■ Use standard figures where possible [i.e. 34.5 cents per mile for additional commute].
Displacement time	Days, increases with wind damage (building percent damage)	The time period for which occupants are expected to be displaced to temporary quarters due to wind damage.	■ No documentation required if FEMA standard values are used for residential and other ordinary buildings use typical values. ■ Provide data derivation method for techniques used.	■ See "What is a Benefit" guidance for residential and critical facilities.
Building floor area	Expressed in square feet	The total heated, enclosed area in the building. Used in conjunction with replacement value to determine potential damages in various wind events.	■ Various forms are acceptable, including tax records, signed appraisals, surveys, and estimates from photographs. ■ Reference or provide a copy of source utilized.	■ Local tax office or appraisers office, surveyor, title and documents with building footprint. ■ Homeowner estimates or measured drawings accompanied by photographs.

Data Type	Value	Description	DOCUMENTATION	Source
Loss of business income	Net (not gross) business income	For commercial facilities, loss of net business income is the measure of loss of function when damage results in closure of the facility.	■ No documentation required if FEMA standard values are used. ■ If estimated, include a description of how derived.	■ The FEMA HAZUS earthquake loss estimation software has typical values for many classes of business that are applicable to all hazards.

Earthquake Data Analysis Methodology: Structural Retrofits of Buildings

Data Documentation Template – Data Source and Documentation Summary

Applicant (State):	
Sub-Applicant:	
Project Title:	

ITEM	DATA VALUE	VALUE USED IN BCA	DATA SOURCE	Documentation Included (Yes, No or NA)
Discount Rate	*The OMB-mandated discount rate of 7% must be used for all BCAs.*			
Mitigation Project Useful Lifetime	*Years*			
Mitigation Project Cost	*Total dollar value*			
Seismic hazard data	*Spectral acceleration values for 50-year and 250-year earthquakes*			
Expected annual number of earthquakes	*Frequency*			
Soil Type	*Soil classification used in building codes* *Important factor in seismic hazard level at project site*			
Building type	*Selection of one of the building construction types within the module*			
Building replacement value	*Expressed as dollars per square foot*			
Building seismic damage function	*Percent damage of building replacement value for each level of ground shaking.*			
Building damage that would result in demolition	*Percentage of building replacement value*			
Dollar value of a Casualty	*Dollars (present year)*			
Dollar value for minor/major injuries	*Dollars (present year)*			
Contents value	*Expressed as dollars*			

Occupancy	*Number of occupants*			
Functional Downtime	*Days, increases with wind damage (building percent damage)*			
Value of loss of service	*Dollar value of loss of public services*			
Continuity premium	*Multiplier on ordinary value of service*			
Displacement costs	*Expressed as dollars per square foot per month, and one time and monthly costs.*			
Displacement time	*Days, increases with wind damage (building percent damage)*			
Building floor area	*Expressed in square feet*			
Loss of business income	*Net (not gross) business income*			